

## Effect of packaging material on shelf life, quality and gene expression of tomatoes

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## Effect of packaging material on shelf life, quality and gene expression of tomatoes

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The effect of packaging material and storage temperatures on the shelf life and quality changes of tomato 'KEK-I' (called as super tomato fruit containing 9° Brix) during storage. Tomatoes with three packaging conditions, Modified Atmospheric Packaging (MAP), MAP+ hinokitiol (MH), and perforated film package as control were compared for their quality change. Packaging material used were Low Density Polyethylene (LDPE) film (40µm) and fresh sheets of hinokitiol. Hinokitiol is a volatile oil and reported to have a strong chelating agent, inhibits microbial spoilage, antifungal, inhibits enzymatic browning and was approved as food additive by Japanese Government.

Tomato is a climateric fruit which shows a dramatic increase in respiration rate and ethylene production rate at the onset of ripening on vine or postharvest. Ripening process is characterized by softening of fruit, degradation of chlorophyll, and synthesis of acids, sugar and lycopene associated with increased expression of ACC Synthase (ACS) gene,. Packaged 'KEK-I' tomatoes stored at 15 °C or 25 °C were analyzed for the ripening related parameters and quality control factors during the intervals of storage. Gas composition was maintained at the recommended level of 3 to 5 % O<sub>2</sub> upto 9<sup>th</sup> day of storage at 15 °C or 25 °C. Control tomato has significant difference of color, texture, and pigments in both the temperatures whereas those under MAP and MH showed little change. A linear relation was found between a\* and lycopene and between b\* and β carotene of all samples throughout the storage period.

Expression levels of genes related to the ethylene production, textural and fermentative changes of tomato were evaluated through quantitative Real Time PCR (qRT-PCR). qRT-PCR results for *LeACS?*, *LeADH*, *LePDC* and *LeTBG4* showed the drastic change of *LeACS?* in the control sample but not in the other samples and genes.

Green of the tomatoes was maintained after 20<sup>th</sup> and 15<sup>th</sup> day of storage under MAP and MH at 15°C and 25°C respectively. Packaging condition and storage temperatures used in this research study are effective for MAP and MH in terms of shelf life extension of 'KEK-I' tomatoes when compared to control. This study would provide valuable information of shelf life extension of 'KEK-I' tomato by using MAP treatment and would be useful for future research on the quality control of fresh tomatoes.

Key words: Modified Atmosphere Packaging, Hinokitiol, 'KEK-I', ACS, ADH, PDC and TBG4